امتحان العمليات العشوائية   ٣ حاسبات (حديث)

٢٩/١/٢٠٠٩

Tanta University
Faculty of Engineering
Computers and control Dept.

Stochastic Processes

3rd year Computers
Thursday 29-1-2009
Time allowed : 3hrs

Answer all the following questions:

Question No. 1

(a) If A and B are independent events , prove that A^c and B are independent.

(b) Let A and B be events with $P(A) = 1/2$, $P(B) = 1/3$ and $P(A \cap B) = 1/4$.

Find :**i**-$P(A|B)$, **ii**-$P(B|A)$, iii-$P(A \cup B)$, iv- $P(A^c|B^c)$, v- $P(B^c|A^c)$

(c) If X be a continuous random variable with the probability

$P(x) = x/2 \quad 0 < x < 2$, and zero elsewhere

Find the **cummulative** distribution function, mean, variance, and standard deviation of X.

(d) Given a and b are constants , find with prove i - $E(a) = ?$ ii - $Var(a + b) = ?$

Question No. 2

(a) Three light bulbs are chosen at random from 15 bulbs of which 5 are defective.

Find the probability that : i- exactly one is defective, ii- none is defective,

iii- at least one is defective iv- at most one is defective.

(b) In a certain college, 25% of the students failed mathematics, 15% failed chemistry, and 10% of the students failed both mathematics and chemistry. A student is selected at random.

i- If he failed chemistry, what is the probability that he failed mathematics?

ii- If he failed mathematics, what is the probability that he failed chemistry?

iii- What is the probability that he failed mathematics or chemistry?

(c) Let X be a continuous random variable with distribution

$f(x) = x/6 + k$ if $0 \leq x \leq 3$ and f(x) equals zero elsewhere.

Sketch the graph of f(x) and thus i- Evaluate k ii- Find $P(1 \leq X \leq 2)$

(d) A pair of fair dice is tossed. Let X assigns to the sum of dices numbers. Calculate the mean, variance and standard deviation of X.

Question No. 3

(a) A fair die is tossed. Let X denotes twice the number appearing, and let Y denote 1 or 4 according as an odd or an even number appears. Find the probability, expectation, variance and standard deviation of: -

i- X ii- Y iii- X+Y iv- XY

(b) A coin weighted so that P(H) = 1/3 and P(T) = 2/3 is tossed until a head or five tails occur. Find the expected number of tosses of the coin.

(c) Determine the expected number of boys in a family with 8 children, assuming the sex distribution to be equally probable. What is the probability that the expected number of boys does occur?

(d) Let X be a random variable with the binomial distribution b(k;n,p).
Prove that E(X) = np.

Question No. 4

(a) Suppose 2% of the items made by a factory are defective. Find the probability P that there are 3 defective items in a sample of 100 itemes

(b) Suppose the weights of 2000 male students are normaly distributed with mean 155 pounds and standard deviation 20 pounds.
Find the number of students with wights

i- less than or equal to 100 pounds, ii- between 120 and 130 pounds,

iii- between 150 and 175 pounds iv- greater than or equal to 200 pounds.

Best wishes

Dr. Eng. Alsayed Sallam

Tanta University

Faculty of Engineering

Department of Computer & Control Eng.

Subject: Compiler Design (3rd year)

Date: 27/1/2009

Time allowed: 180 Min.

Full Mark: 100 Mark

Final Term Exam (First Semester)

Answer Only Five Questions (ملحوظة هامة: الأسئلة في ورقتين)

The First Question

(a) Indicate whether each of the following statements is ***true*** or ***false***.

a. Scanners perform syntax analysis.
b. An interpreter is a form of compiler that runs slowly.
c. A parser recognizes phrases structure in an input stream.
d. All regular grammars are right linear.
e. All right linear grammars are context-free.

(b) "A compiler construction can be divided into front-end and back-end phases"

1. What is a compiler?
2. Show the compiler phases and the aim of each phase.
3. What is each of the *front-end* and *back-end* terms means?

(c) Show the output of each of the main three phases of a compiler corresponding to the following input statements.

```
c := a + b ;iF ( a = b ) c := b ; c := a ;
```

The Second Question

(a) Show a finite state machine in either state graph or table form for the following language: "Strings containing an even number of zeros and an odd number of ones" What is the input alphabet of this language?

(b) What are the advantages and disadvantages of using linked lists, arrays, and binary search trees techniques for implementing symbol tables.

(c) Show the binary search tree which would be constructed to store the following list of identifiers: `sum, x3, count, x210, x, x33`

The Third Question

Given the following grammar **G**:

1. S → SaA	3. A → AbB	5. B → cSd	7. B → f
2. S → A	4. A → B	6. B → e	

(a) Classify the grammar according to Chomsky's definitions.

(b) Show a left-most derivation, a right-most derivation, and a parse tree for cebedaceaed input string.

(c) Is the grammar G ambiguous one? If it is eliminate its ambiguity.

(d) Determine whether the grammar G is LL(1). If it is not, make it LL(1).

The Fourth Question

(a) Show a pushdown machine for the language of the grammar **G** given above in the third question.

(b) Write a recursive descent parser for that grammar.

(c) Show the sequence of stacks that occurs when the pushdown machine in (a) parses the string `cebedaceaed`.

P. T. O.

The Fifth Question

(a) Compare between LR(k) and LL(k) parsing.

(b) What is a shift/reduce parser? Outline how a shift/reduce parser may work.

(c) Using the grammar **G** given above in the third question, show the sequence of stack and input configurations as the string `cebedaceaed` is parsed with shift reduce parsing.

(d) Consider the arithmetic expression: `d * (a + b) * c (a + b) * c`

1. Use the register allocation algorithm to construct a weighted syntax tree.
2. Write strings of atoms corresponding to this expression.

With my best wishes

25/1

Tanta University
Faculty of Engineering
Computer Eng. & Control Department
Time: 3Hours

Third year Exam
Operating Systems
First Term 2008/9
25/1/2009.

Answer all Questions (Q in 3 pages):

1- Put √ for the true and X for the false: (See page 3)

a) In monoprogramming the the fixed partition scheme is used for memory management,

b) In multiprogramming the relocation and protection problems can be solved by using a two hardware registers called "*base*" and "*limit*" registers,

c) The main objective of using swapping scheme in MM is to improve the memory utilization,

d) In Fixed memory partition scheme using a separate input queue for jobs is better than using a single input queue,

e) In a *bitmap* scheme the smaller size of allocation unit the bigger bitmap size,

f) *MMU* maps the *VM* addresses onto physical memory addresses,

g) Memory mapped I/O and Polling are two scheme used for communicating the CPU with the I/O devices,

h) Each I/O device attached to a computer needs some device-specific code for controlling it. This code, called the *device driver*,

i) *Deadlock* refers to a specific condition when two or more processes are each waiting for another to release a resource, or more than two processes are waiting for resources in a circular chain,

j) *Mutual exclusion* defined as, a resource that cannot be used by more than one process at a time,

k) Use of a swap file or swap partition is a way for the operating system to provide more memory than is physically available by keeping portions of the primary memory in secondary storage,

l) *Processes* are formally defined by the operating system running them and so may differ in detail from one OS to another,

P.T.O.

m) *Long-term Scheduler*, decides which jobs or processes are to be admitted to the ready queue,

Short-term Scheduler, (*dispatcher*) decides which of the ready, in-memory processes are to be executed (allocated a CPU),

n) *Paging* is the process of saving inactive virtual memory pages to disk and restoring them to real memory when required,

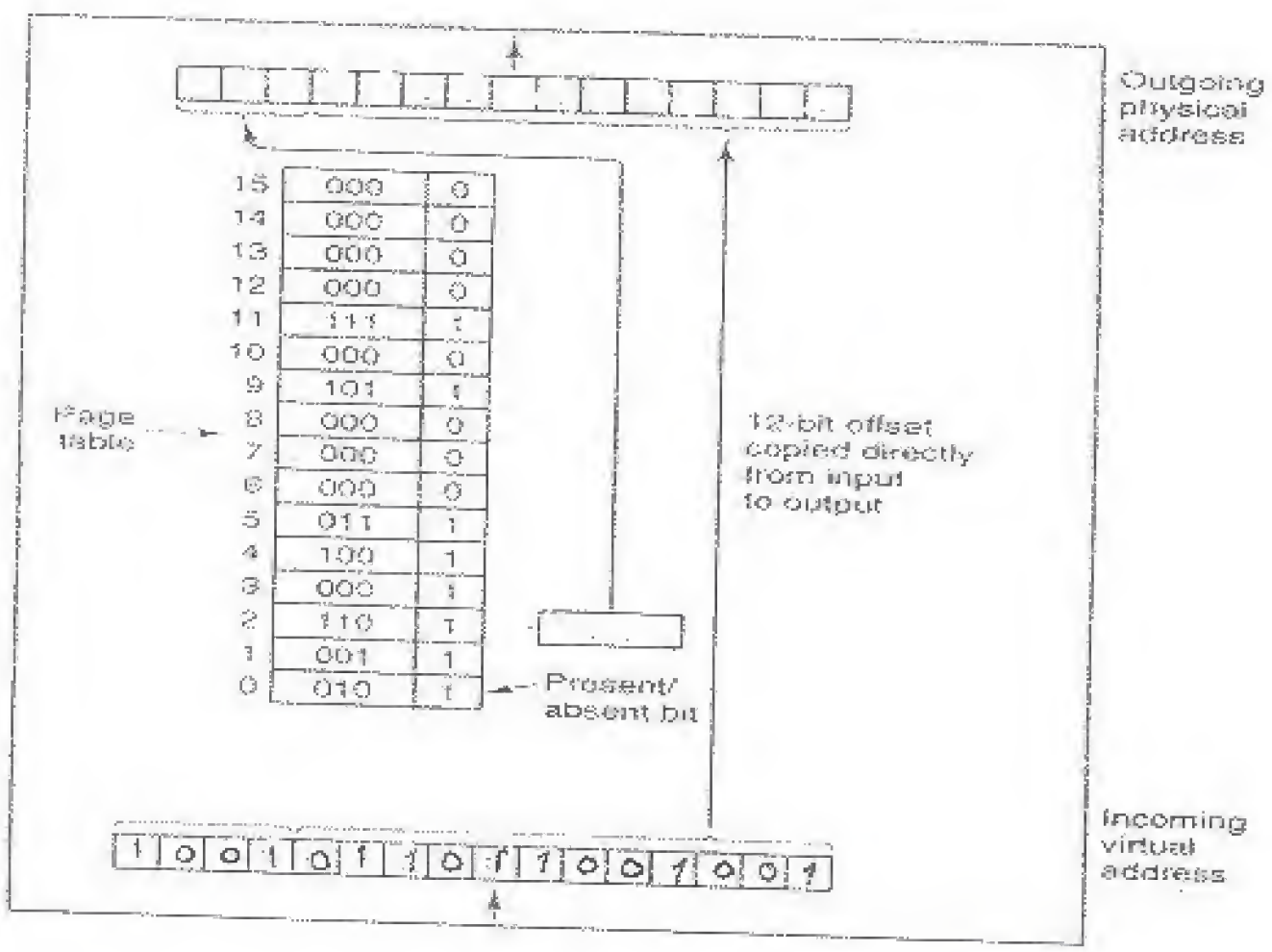
o) The main difference between virtual memory implementations using pages and using segments is the memory division with fixed and variable sizes, respectively,

p) *Least Recently Used (LRU)* is a channel which allow specific devices such as hard drives, CD ROMS, tape drives and sound cards to access memory directly, without having to pass through the CPU,

q) *PCB* contains the information associated with each process,

r) *Rround-Robin* algorithm is used in scheduling the Interactive Systems.

2- (a) The figure shown is a page table; write the corresponding physical address in the register



P.T.O.

(b) State five System Calls.

3- (a) What are the fundamental differences between a process and a thread?

(b) An OS has 128 MB of RAM allocated in units of 64 KB. How many Bytes are needed if a bitmap is used to keep track of free memory?

(c) What are the two main functions of an operating system?

4- (a) There are two ways to keep track of memory usage; bitmaps and free lists, draw the figures showing these two schemes.

(b) State five types of Operating System.

تنبيه هام:

في السؤال الأول لابد من كتابة الفقرة في ورقة الإجابة كاملة كما هي مكتوبة بورقة الأسئلة ثم وضع علامة X أو √ علي شمال رقم الفقرة

√ (a) .....

X (b) .....

مع تمنياتي بالتوفيق،

Dr. Galal A. Atlam

١/٢٢

١/٢٢

جـــامعة طنـطـــا
كـــلية الهـندســـة
قسم الحاسبات والتحكم الآلى

امتحان معالجة الإشارات الرقمية
الفرقـــة الثالثـــة – حاســبات
الزمن ٣ ساعات – يناير ٢٠٠٩

1-a Write short notes on :
Frequency aliasing.
Chebyshev polynomial.
Frequency transformation.
Impulse response of the system.
Methods of realization of an IIR filter.

1-b The impulse response of a system is given by $h(t) = e^{-2t}u(t)$. Its response due to the excitation $f(t) = tu(t)$.

1-c Consider the sequence $\{f(n)\} = \{1,-1.5,2,0,3\}$, find its Z transform.

2-a Describe the differences between :
Analog signals and Digital signals.
Causal systems and Non-causal systems.
FIR digital filters and IIR digital filters.
Recursive systems and Non-recursive systems.
Strictly stable systems and Wide sense stable systems.

2-b Design a low pass maximally-flat analog filter with the following specifications:
Pass band 0 to 1.5 kHz , attenuation ≤ 0.8 db.
Stop band edge at 3.5 kHz , attenuation ≥ 30 db.

2-c Realize the following transfer function in parallel form :

$$\frac{S^3 + 2S^2 + 0.5}{0.5S^4 + 3S^3 + 4S^2 + 2S + 1}$$

3-a Explain the steps of digitization process of analog signals.

3-b In the following difference equation $\{f(n)\}$ is the input to a linear shift invariant system and $\{g(n)\}$ is its output. Obtain the transfer function of the system, test its stability and realize it on a direct canonic form :
$g(n) = 0.1f(n) + 0.5f(n-1) - 0.6f(n-2) + 0.3g(n-1) + 0.5g(n-2) + 0.7g(n-3)$

4-a Derive a mathematically algorithm for decimation in time Fast Fourier Transform, and illustrate a reduction diagram of a 16 point FFT.

4-b calculate the 8 point DFT of the following sequence :
$f(0) = f(1) = f(2) = f(6) = f(7) = 1$ and $f(3) = f(4) = f(5) = 0$

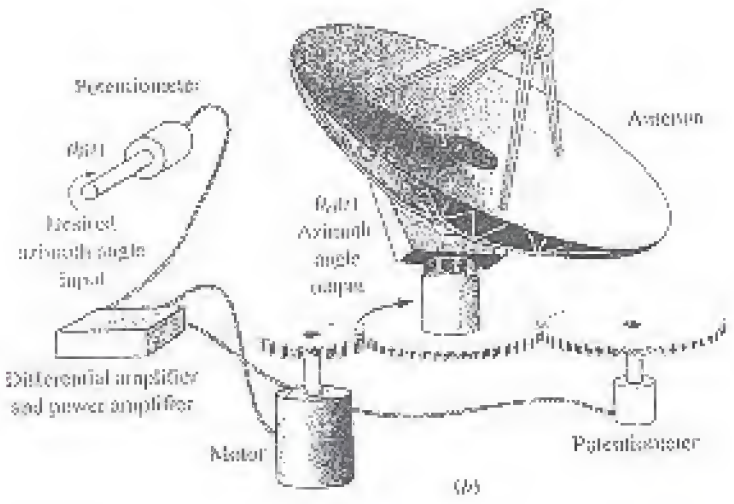
TANTA UNIVERSITY
FACULTY OF ENGINEERING

Department : Computer and Control Engineering
Lecturer : Professor Ahmed F. Amer
Subject : Automatic Control Engineering **Marks : 75**
Date : 22 / 1 / 2009 **Time : 3 Hrs**

Final Exam

Answer the Following Questions:

1.a)Find the transfer function for each the antenna position control system schematic shown in Fig.1 below.



(b)

Fig.1

2.a)Find the transfer function, $G(s)=V_o(s)/V_i(s)$, for the network shown in Fig.2 below.

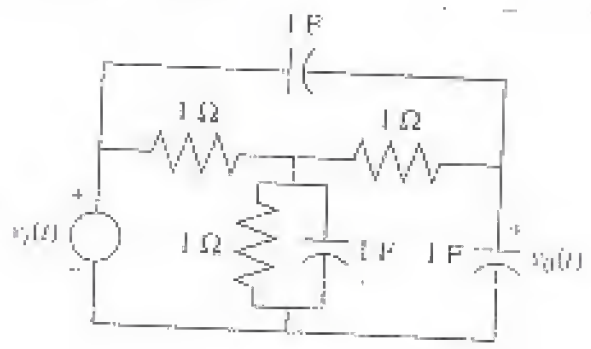


Fig.2

b) For the system of Fig.3 find the transfer function, $G(s)=X_1(s)/F(s)$.

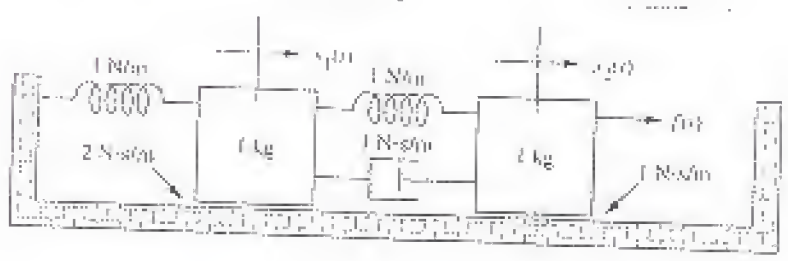


Fig.3

3.a) Given the unity feedback control system whose transfer function G(s) where,

$$G(s)=\frac{k}{s^n(s+a)}$$

find the values of n, k, and a in order to meet specifications of 10% overshoot and $k_v = 100$.

b) The open-loop transfer function of a unity feedback system G(s) is given by,

$$G(s)=\frac{k}{(s+10)(s^2+4s+5)}$$

a. Find the range of k for stability.
b. Find the frequency of oscillation when the system is marginally stable.

4 . a) The open-loop transfer function of a unity feedback system G(s) is given by,

$$G(s)=\frac{k(s+1)}{s(s+2)(s+3)(s+4)}$$

Do the following:
a. Sketch the root locus.
b. Find the asymptotes.
c. Find the value of gain that will make the system marginally stable.
d. Find the value of the dynamic gain and the steady-state gain for which the closed-loop transfer function will have a pole on the real axis at 0.5.

5. a) Using the Nyquist criterion for the unity feedback system given by its transfer function G(s) where,

$$G(s)=\frac{k}{s(s+3)(s+5)}$$

find the range of gain , k, for stability, instability, and the value of gain for marginal stability. For marginal stability, also find the frequency of oscillation.

b) Draw the Bode log-magnitude and phase plots of G(s) for the unity feedback system, where,

$$G(s)=\frac{(s+3)}{(s+2)(s^2+2s+25)}$$

Find also the system gain margin and the system phase margin.

STAFF

StaffMember	Department
Fawzy	Computers
Kamel	Computers
Amin	Industrial Control

CHAIRMANSHIP

Department	Chairman
Computers	Farouk
Neuroscience	Abdel Rahman

Fig. 2 Relations for Ques. 3, part (c)

Question 4

Consider a two-relation database

EMPLOYEES (RegistrationNumer, Name, Age, Salary)

SUPERVISION (Supervisor, Employee)

where the supervisors and employees in the relation SUPERVISION are given by their registration numbers. Form a relational-algebra expression for:

(a) Finding the names and salaries of the supervisors of the employees earning more than a certain salary value.

(b) Finding the employees earning more than their respective supervisors, showing the registration numbers, names, and salaries of the employees and supervisors.

Question 5

(a) Write a short account on the families of elementary domains that allow representation of time instants and time intervals.

(b) Give a set of SQL commands that can construct a relation

TRAINEE (ID, FirstName, Surname, Division)

with the following specifications:

- The attribute ID is a primary key, with domain char (10).
- The attributes FirstName and Surname are each subject to a constraint not null, with domain char (20).
- There is a constraint unique on the attributes FirstName and Surname, taken together.
- The attribute Division, with domain char (15), refers to an attribute DivisionName in another table TRAINER, thus constituting a foreign key.
- The foreign key specified above has correction policies of set default for deletions and cascade for updates.

Do these commands belong to the data definition language (DDL) or data manipulation language (DML)? Why?

Prof. Dr. Mahmoud M.Fahmy

Tanta University
Faculty of Engineering
Computers and Control Department

Third Year Students
First Term Exam
January 2009

DATABASE SYSTEMS — Code : CCE 3112

Answer the following *five* questions. Time allowed : 3 hours.

Question 1

(a) What is a data model? Discuss briefly its main types. Why is the relational model, in particular, the most widespread?

(b) List the advantages and disadvantages (if any) of a database management system (DBMS).

(c) The NULL values are adopted to solve the problem of incomplete information in relational models, but restrictions on the use of these NULLs do exist. Explain this statement with illustrative examples.

Question 2

(a) Prove mathematically that every relation has a key. Also differentiate between a key, superkey, primary key, and foreign key.

(b) Find the union, the intersection, and the two possible differences of the two relations of Fig. 1, after appropriate renamings.

(c) In what sense are the selection and projection operators complementary to each other? For the relation PERSONNEL of Fig. 1, find

$$\Pi_{\text{Surname}} (\sigma_{\text{Income} \geq 2000} (\text{PERSONNEL}))$$

MANAGEMENT

Surname	Branch	Wages
Safwat	Alexanria	2500
Nassar	Cairo	2500
Hamed	Tanta	2000
Safwat	Mansoura	2000

PERSONNEL

Surname	Factory	Income
Safwat	Alexanria	2500
Nassar	Cairo	2500
Hamed	Tanta	2000
Safwat	Mansoura	2000
Hashem	Alexanria	2100
Mostafa	Cairo	2100
Morad	Tanta	1800
Sallam	Mansoura	1800

Fig. 1 **Relations for Ques. 2, parts (b) and (c)**

Question 3

(a) Give a definition for the natural join of two relations. Show that this join can be simulated through three consecutive operations: renaming, equi-joining, and projection.

(b) Verify that the natural join of two relations with identical sets of attributes is the same as the intersection of the two relations, whereas the natural join of two relations with no attributes in common becomes a 'cartesian product' defined as the juxtaposition of a tuple from the first relation and a tuple from the second.

(c) Find the left, right, and full outer joins for the two relations of Fig. 2.

continued on page 2